

subject matter of this invention to overcome the rejections under 35 USC 102(e) and 35 USC 103(a). Specifically, the amended independent claim 1 includes the limitation that the top plate of the heat slug has a plurality of hollow cylindrical contact bodies each having a flat bottom for providing close contact with a corresponding contact pad and bonding said heat slug to said substrate panel. Claim 11 has been amended to include all the limitations of original claim 17 and its base claims.

The gist of this invention has two aspects. One is to provide strong support and protection for the packaged die and the other is to assist heat dissipation. To achieve these goals, hollow cylindrical contact bodies having flat bottoms (page 5, line 18) are formed in addition to the four flanges that extended downward from the top plate. It can be appreciated that the cylindrical contact bodies provide strong support to prevent the heat slug from being damaged by an external force. Consequently, the packaged die is well protected. In addition, the flat bottom provides close contact to the substrate.

Barrow's art provides four flat contact bodies extended from the top plate slantwise. The contact body bears absolutely no resemblance to the hollow cylindrical contact body of this invention. The contact body being extended downward from the top plate slantwise does not provide the strong support as the cylindrical contact body. It is clear that Barrow neither teaches nor suggests the instant invention. In the office action with respect to original claim 7, the Examiner states that although Barrow does not specifically disclose the claimed hollow interior, the bend down portions at four corners could be considered as the claimed hollow interior. It is also important to note that the thermal path of the invention is from the integrated circuit to the heat slug and the

heat dissipation direction is upward. To the contrary, the thermal path of Barrow's art is longer and the direction of heat dissipation is downward. As discussed above, a hollow cylindrical structure that provides strong support can never be appreciated from the bend down portions. Applicants contend that the hollow cylindrical contact bodies as defined in amended claim 1 are never recognized and can not be obvious in view of the bend down portions by a person having ordinary skill.

Wang's prior art provides four solid cylindrical contact bodies extended from the top plate slantwise. Although the contact body has a cylindrical shape, the heat slug is very different from the heat slug of this invention that comprise four flange at the edges and four hollow cylindrical contact bodies. The strong support provided by the heat slug of the instant invention can not be achieved by Wang's art. The hollow structure is neither taught nor suggested by Wang. In addition, the heat spreader in Wang's art is encapsulated by a molding material using encapsulating technique. It requires an extra molding step in bonding the heat spreader to a substrate. In the office action with respect to the original claim 7, the Examiner also states that although Wong does not specifically disclose the claimed hollow interior, the bend down portions at four corners could be considered as the claimed hollow interior. As discussed before, a hollow cylindrical structure that provides strong support can never be appreciated from the bend down portions. Applicants respectfully contend that the statement is unwarranted with regard to the amended claim 1.

Guzuk's art teaches four flat contact bodies extended from the top plate in a vertical way. Nowhere throughout Guzuk's disclosure has any hollow cylindrical contact

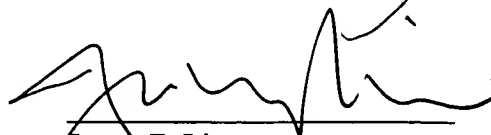
body been taught to provide strong package support and efficient heat dissipation. It is clear that Guzug's differs from the instant invention significantly both physically and functionally.

It should be noted that the heat slug of this invention provides a unique combination of flanges and hollow cylindrical contact bodies for a heat slug. The unique combination has never been found in any of the cited prior arts. Furthermore, the prior art references do not contain any suggestion that they can be combined. Even if combined, the references would not meet the amended Claim 1.

From the foregoing discussion, it is clear that the instant invention differs from the cited prior arts. The physical difference results in different effects and is not obvious. The amended base Claims 1 have overcome the rejections under 35 USC 102(e) and 103(a) and is patentable. Its dependent claims 2-7 in the amended form should be allowable. The amended claim 11 that replaces the original claim 17 in an independent form should be allowable. Dependent claims 12-20 in the amended form should also be allowable.

FIG.1 has been amended to include a --Prior Art-- legend as shown in the attached drawing submitted for approval. Claims 1-7 and 11-20 are submitted for allowance. Prompt and favorable reconsideration of the application is respectfully requested.

Respectfully submitted,



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